

THE COCKROACH GENUS *MARGATTEA* SHELFORD, WITH A NEW
SPECIES FROM THE KRAKATAU ISLANDS, AND
REDESCRIPTIONS OF SEVERAL SPECIES
FROM THE INDO-PACIFIC REGION
(DICTYOPTERA: BLATTARIA: BLATTELLIDAE)

LOUIS M. ROTH

Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts
02138. (Correspondence: Box 540, Sherborn, Massachusetts 01770.)

Abstract. — Diagnostic characters for the cockroach genus *Margattea* Shelford are given. *Theganosilpha* Kumar and Princis is synonymized with *Margattea*. *Margattea paraceylanica*, n. sp. from the Krakatau Islands is described. The following *Margattea* species are redescribed: *ceylanica* (Saussure), *nimbata* (Shelford) (previously considered a synonym of *ceylanica*), *perspicillaris* (Karny), *anceps* (Krauss), *contingens* (Walker) [= *humeralis* (Walker)], and *longealata* (Brunner). A key to the above males is provided. *Symploce obtusifrons* (Walker) (sp. incertae sedis) is transferred to *Margattea*. The following species of *Margattea* are transferred to the genus *Balta* Tepper: *aurea* Hanitsch, *setifera* (Hanitsch), *parvula* (Bolívar), *crassivenosa* (Bolívar), and *longicercata* (Bolívar). The position of the male's genital hook and rotation of the ootheca in subfamily placement (Pseudophyllo-dromiinae or Blattellinae) is discussed.

Key Words: Cockroaches, Blattellidae, taxonomy, Krakatau Islands

Princis (1969: 862, 1971: 1162) listed 44 species of *Margattea* Shelford. It is a widely distributed genus with species occurring in Asia, Indonesia, Malaysia, South Pacific, and Africa. This paper is a result of my attempt to identify a few specimens of *Margattea* collected in the Krakatau Islands and Australia. After reading the many species descriptions it was evident that the genus needed revision and that the various taxa should be redescribed with particular emphasis on male genitalia. In the original descriptions of known species, 12 were based on both sexes, 17 on males, and 15 on females only. Even when males were described, a number of characters which are known to be important today (e.g. type of front femur, whether or not the tarsal claws are toothed, whether or not the male has a

tergal gland, and the shapes of the male genital phallomeres were not mentioned). Identification of females, when only that sex is known, is difficult unless the specimens are topotypic and the species have distinctive color patterns. Based on descriptions a number of species of *Margattea* belong in another genus. For example, I have examined the types of the following species and they all belong in the genus *Balta* Tepper: *Margattea aurea* Hanitsch (HDEO), *M. setifera* Hanitsch (NRSS), *M. parvula* Bolívar (BMNH), *M. crassivenosa* Bolívar (BMNH), and *M. longicercata* Bolívar (BMNH).

The Krakatau specimens were collected by personnel from institutions in Australia, Indonesia, and the United Kingdom during 1984 and 1985 expeditions (Thornton and Rosengren, in press). Thirteen species of

cockroaches were taken and I will report on these elsewhere. Only one species of *Margattea* was collected and it did not agree with the four species of the genus previously reported from these islands; I am describing it as new. I will present the diagnostic characters of the genus and redescribe the following taxa that have been recorded from the Krakataus by others: *M. ceylanica* (Saussure), *M. contingens* (Walker) [= *M. humeralis* (Walker)], *M. anceps* (Krauss), and *M. nimbata* (Shelford). *Kuchinga* Hebard has been considered a junior synonym of *Margattea*, and I have concluded that *Theganosilpha* Kumar and Princis also is a junior synonym and therefore will redescribe their type species [*Kuchinga longecalata* (Brunner) and *Theganosilpha perspicillaris* (Karny)].

The following museums and their curators or collection managers loaned me specimens:

- (ANIC)—Australian National Insect Collection, CSIRO, Canberra, A.C.T., Australia; Dr. D.C.F. Rentz.
- (ANSP)—Academy of Natural Sciences of Philadelphia, PA, U.S.A.; Mr. Donald Azuma.
- (BMNH)—British Museum (Natural History), London, England; Mrs. Judith Marshall.
- (BPBM)—Bernice P. Bishop Museum, Honolulu, HI, U.S.A.; Mr. Gordon M. Nishida.
- (DEIG)—Deutsches Entomologisches Institut, Eberswald, Germany; Dr. G. Petersen.
- (HDEO)—Hope Department of Entomology, University Museum, Oxford, England; Dr. George C. McGavin.
- (MCZH)—Museum of Comparative Zoology, Harvard University, Cambridge, MA, U.S.A.
- (MNHG)—Museum d'Histoire Naturelle,

Geneva, Switzerland; Dr. Bernd Hauser.

- (NRSS)—Naturhistoriska Riksmuseet, Stockholm, Sweden; Per Inge Persson.
- (RNHL)—Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands; Dr. Jan van Tol.
- (TUVA)—La Trobe University, Bundoora, Victoria, Australia; Mr. Patrick J. Vaughan and Prof. I.W.B. Thornton.
- (ZILS)—Zoological Institute, Lund, Sweden; Dr. R. Danielsson.

Genus *Margattea* Shelford

Margattea Shelford 1911:155. Type species, by monotypy: *Blatta ceylanica* Saussure, Rehn 1931: 302; Bey-Bienko 1938: 121; 1950: 145; Princis 1969: 862.

Kuchinga Hebard 1929:39, 41. Type species, by selection: *Phyllodromia longecalata* Brunner; Hanitsch 1931b: 392 (synonymized with *Margattea*); Bey-Bienko 1938: 121 (synonymized with *Margattea*).

Theganosilpha Kumar and Princis 1978: 33; Asahina 1979: 114, 119. Type species by monotypy: *Theganopteryx perspicillaris* Karny. New Synonymy.

Diagnosis.—The following characterization is based on the species mentioned earlier as well as a study of more than 25 described and undescribed species which I plan to present elsewhere: Third and fourth maxillary palpal segments usually longer than the fifth (Fig. 40). Tegmina and wings fully developed or variably reduced, hind wings rarely absent; if reduced, hind wings are generally shorter than the tegmina and may be vestigial; if fully developed, hind wings have the discoidal and median veins simple, subcosta and most costal veins clubbed or thickened distad, cubitus vein essentially straight or weakly curved, with 1–4 complete (rarely 0 branches in reduced wings) and no incomplete branches, apical triangle small (Figs. 6, 13). Abdominal terga unспе-

cialized, or with a group of setae near the posteromedial margin of eighth tergum (Figs. 24, 28); this specialization may be hidden under the seventh tergum. Anteroventral margin of front femur Type B₂ or B₃ (with 1 to 4 proximal spines) (Fig. 34) (both types may occur in the same species, differing between the sexes), rarely Type C₂; all 4 proximal tarsomeres with pulvilli, tarsal claws symmetrical with inner margins generally denticulate (Figs. 7, 20, 32; the serrations often subobsolete and sometimes only seen at high magnification of a compound microscope), arolia present. Supranal plate usually relatively short, transverse, right and left male paraprocts similar, relatively simple plates (Figs. 8, 16). Male subgenital plate symmetrical or subsymmetrical styles simple, cylindrical, generally similar (Figs. 1, 29, 44); some species with a stylelike process at the base of each style giving the appearance of having 4 rather than 2 styles (Figs. 51, 69, 72). Male genitalia with hooklike phallomere on the right side; median sclerite may have an associated sclerite sometimes with setal brushes (Figs. 1, 26, 29, 69).

Comments.—The principal diagnostic characters used by Kumar and Princis to distinguish *Theganosilpha* from *Theganopteryx* were hind wings reduced in both sexes, eighth tergum of male weakly specialized, anteroventral margin of front femur Type B₃ (some large proximal spines followed by a row of piliform spinules and terminating in 3 distal spines), inner margins of tarsal claws finely denticulate. Asahina (1979: 119) accepted *Theganosilpha* as a valid genus and correctly pointed out that it was closer to *Margattea* than to *Theganopteryx*.

Rehn (1931) stated that the front femur of *M. ceylanica* was Type B₂ and that the tarsal claws were equal with internal margins unspecialized (i.e. not denticulate). Bey-Bienko (1938: 121) believed that the tarsal claws of *M. ceylanica* and *M. longealata* are equal and unspecialized, but later (Bey-

Bienko 1958: 587) correctly stated that the former has barely visible notched tarsal claws. The claws of *M. longealata* also have subobsolete serrations. Asahina (1979: 119) pointed out that since some species of *Margattea* have toothed tarsal claws, this character cannot be used to distinguish it from *Theganosilpha*. The size of the denticles may be so small that they cannot be seen at the magnifications usually used in examining pinned specimens with a dissecting microscope. If slides are prepared and the claws are examined at high magnification with a compound microscope, the minute teeth, or their remnants (Figs. 7, 20) can be seen.

The male abdominal terga of *M. ceylanica* and *M. longealata* are unspecialized. The male of *Theganosilpha perspicillaris* has a setal tuft on the eighth tergum. There are many examples of genera in which the males of a genus have or lack abdominal tergal glands (used in courtship behavior), and in those species that have them the specializations may be found on one or more segments. For example, species of *Blattella* may have glands on T7 only, or on T7 and T8, and the morphology of the glands may differ considerably between different species (Roth 1985a). In species of *Parcoblatta* Hebard, the males have glands on T1 only (6 spp.), T1 and T2 (4 spp.), or they are absent (2 spp.) (Hebard 1917).

Asahina (1979: 119) separated *Theganosilpha* from *Margattea* as follows: In *Theganosilpha* the front femur is Type B₃, the tegmina are narrowed apically, somewhat nail shaped, rather coriaceous, and the hind wings are rudimentary but sometimes one half the length of the tegmina. In *Margattea* the front femur is Type B₂, the tegmina are not narrowed apically or nail shaped, and it and the hind wing are fully developed. Hebard (1929: 4) pointed out that wing reduction often is an unreliable generic character (unless correlated with other more stable features), and the armament on the front femur also is subject to individual variation. Kumar and Princis (1978: 33) described the

hind wings in both sexes of *T. perspicillaris* as reduced to small narrow lappets about half the length of the tegmina. The male lectotype and two male paralectotypes of this species actually have vestigial wings distinctly less than half the length of the tegmina. The hind wings of a male *T. perspicillaris* (fig. 25 in Asahina 1979) are more than half the length of the tegmina and their veins are well developed.

It is possible for a genus to have more than one type of front femur. Species of *Balta* may have Type B or C (Hebard 1943: 39). Bey-Bienko (1938: 121) claimed that *Margattea inermis* Bey-Bienko is aberrant in having a Type C₂ rather than Type B femur. *Margattea hemiptera* Bey-Bienko (Bey-Bienko 1958) and *Margattea elongata* Kumar (Kumar 1975: 105) have reduced tegmina and wings and Type B₂ front femurs. I have examined specimens of *Theganosilpha ogatai* Asahina and *Theganosilpha satsumana* Asahina (identified by Asahina) and in both species the males have Type B₂ and the females Type B₃ femurs. There is no correlation between Type B₃ femurs and wing reduction, and Type B₂ femurs with fully developed organs of flight.

The difference of 1 distal spine on the anteroventral margin of the front femur (Type B₂ vs. Type B₃), the variable reduction of tegmina and wings, and the presence or absence of a male tergal gland cannot be used to distinguish between *Margattea* and *Theganosilpha*, and I am synonymizing the latter genus. The diagnostic characters for the genus *Margattina* Bey-Bienko are so similar to those of *Margattea* (Bey-Bienko 1958: 587) that I believe the former genus (known only from the type species *Margattina trispina* Bey-Bienko, a single male from China) should be reevaluated.

SUBFAMILY PLACEMENT OF *MARGATTEA*

The genitalia of male cockroaches are strongly asymmetrical and one of the more conspicuous structures is a hooklike phallosome (Fig. 29) although in some species

(Blaberidae) it may be greatly reduced. According to McKittrick (1964) in the Blattellidae the hook is on the left side in the Blattellinae, Ectobiinae, and Nyctiborinae, or on the right in the Plectopterinae (= Pseudophyllodromiinae in Vickery and Kevan's 1983, classification). McKittrick also claimed that the females of Blattellinae, Ectobiinae, and Nyctiborinae rotate their oothecae during oviposition, whereas the Plectopterinae do not. This concept holds for a large number of species but Brown (1975) found that *Ectobius panzeri* Stephens has the male genital hook on the right side although the female rotates its ootheca (Brown 1973). Bohn (1987) found that the male of *Phyllodromica (Lobolampra) montana* Chopard and several other species of the "montana-group" of *Phyllodromica* (Ectobiinae) show a similar reversal of the right-left asymmetry in male genitalia and have the hook on the right whereas some other species of the genus have the hook on the left. Although Bohn did not mention oviposition behavior of *P. montana* in his paper, he (personal communication) was "convinced" that it rotates its ootheca and that it and *Ectobius panzeri* are true Ectobiinae, all of which rotate their oothecae.

In *Margattea* the male's genital hook is on the right side which in McKittrick's system places it in the Plectopterinae. However, 2 females of *Margattea nimbata* were carrying oothecae in the rotated position (Fig. 25) a behavior which is characteristic of the Blattellinae. As Bohn (1987: 303) pointed out, it is not sufficient to use the position of the genital hook in placing blattellids in their respective subfamilies. He also claimed that symmetry reversal has occurred several times independently during the evolution of the Blattaria and that it is possible there are species of Blattellinae with reversed symmetry as those found in the Ectobiinae. Bohn concluded that other characteristics such as oothecal rotation, and especially structure of the phallosome sclerites be considered.

Since the position of the male's genital hook cannot always be used to distinguish Plectopterinae from Blattellinae, oothecal rotation or its absence appears to be the best discriminating character, and I used it to place a number of Blattellidae into these 2 subfamilies (Roth 1968a, 1971: 134). Thus *M. nimbata*, which rotates its ootheca, belongs in the Blattellinae even though the genital hook is on the right side. But the problem here is more complex. The oviposition behavior of the species other than *nimbata* is not known. Three females of *Margattea longecalata* (Brunner) were carrying oothecae whose keels were directed dorsad (i.e. non-rotated) (Fig. 62). It is possible that these specimens were collected before they could rotate their oothecae prior to depositing them. However, the ootheca is distinctly different in morphology from that of *nimbata*. It is particularly unusual in being wider than high and strongly resembles the oothecae of *Lophoblatta brevis* Rehn and *Lophoblatta arlei* Albuquerque from South America (see figs. 1-6 in Roth 1968b). These are the only known members of the Plectopterinae that carry their oothecae with their keels dorsad (i.e. non-rotated) until the eggs hatch; other species in this subfamily drop the non-rotated oothecae shortly after it is formed. One ootheca of *M. longecalata* (KOH treated) lacked calcium oxalate crystals. The oothecae of *L. brevis* and *L. arlei* have relatively few calcium oxalate crystals, but egg cases in other species in the Plectopterinae have large amounts of calcium oxalate crystals.

The amount of calcium oxalate in cockroach oothecae decreased during the evolution of ovoviviparity and viviparity in the Blaberoidea. Oothecae of the Blattellinae usually have large amounts of calcium oxalate crystals but the amount of this compound varies from dense to sparse to absent in species of *Blattella*, all of which carry their oothecae externally in the rotated position until the eggs hatch (Roth 1968a). Species of the African blattellid genus *Stay-*

ella Roth (Roth 1984) have an ootheca that is typical of species of *Blattella*, but it is retracted and carried internally until the eggs hatch (Roth 1982). The egg cases of *Stayella* lack calcium oxalate as do species of Blaberidae, all of which incubate their eggs internally.

The oothecae of *M. longecalata* are somewhat transparent in the specimens studied and their eggs are undeveloped (the eggs from one of the oothecae were removed and cleared and showed no embryonic development). It is possible that *M. longecalata* carries its ootheca in the vertical position for the entire gestation period, as in *Lophoblatta*, but the 3 females reported here were collected shortly after their oothecae were formed and therefore their eggs show no development. It is probable that *Margattea contingens* (Walker) has an ootheca similar to that of *longecalata* because the male and female genitalia of these 2 taxa are so much alike (Figs. 51, 57-59, 61, 63, 68-70). The male genitalia (particularly the left and right phallomeres) of *M. longecalata* and *M. contingens* differ considerably from those of other species in the genus. Perhaps these two species should be placed in a separate genus; if this is done Hebard's *Kuchinga* (type species, *longecalata*) would be resurrected. For the present I am placing them in a species group of *Margattea*.

SPECIES GROUPS OF *MARGATTEA*

I have examined about 25 described species of *Margattea* and about 10 taxa that apparently are new. Thus far my study indicates that the genus can be arranged in seven species groups. The seven species discussed in this paper belong to 3 groups as follows (other species in the groups will be presented elsewhere):

Ceylanica species group.—Eighth abdominal tergum unspecialized. Accessory stylelike structures near the base of the styles absent (Fig. 1). Tegmina and wings fully developed. Front femur Type B₂. Species: *ceylanica*.

Perspicillaris species group.—Eighth abdominal tergum specialized (Figs. 9, 24, 28, 43). Interstyler region may be simply a continuation of the lateral margins of the plate (Figs. 23, 44), or there is a small plate sometimes bearing small dark spines (Fig. 29). Accessory stylelike structures absent (Figs. 18, 29). Tegmina and wings fully developed or variably reduced, the wings sometimes vestigial. Front femur Type B₂ or B₃. Species: *perspicillaris*, *nimbata*, *paraceylanica*, *anceps*. This is the largest group and contains at least an additional twelve species.

Contingens species group.—Eighth abdominal tergum unspecialized. Lateral corners of subgenital plate produced having the appearance of styles (accessory stylelike structures; Figs. 55, 56). Male genital phallobes: hook portion of right phallobes, slender, elongate, strongly curved; median phallobes needlelike, accessory median phallobes absent; left phallobes roundly bulbous basally, relatively simple (Figs. 51, 57–59) (cp. the differences in the taxa belonging to the other 2 species groups). Tegmina and wings fully developed. Front femur Type B₂. Species: *contingens*, *longealata*.

KEY TO SOME MALES OF
INDO-PACIFIC *MARGATTEA**

- 1. Eighth abdominal segment without a tergal gland 2
- Eighth abdominal segment with a tergal gland 4
- 2. Subgenital plate with lateral corners produced giving the appearance of accessory stylelike structures (Figs. 51, 55, 56, 69) 3
- Lateral corners of subgenital plate rounded, not stylelike (Fig. 1) *ceylanica*
- 3. Head brown with a yellowish orange band between antennal sockets (Fig. 65). Pronotal disk with a broad dark brown macula (Fig. 64) *longealata*

* Includes only males discussed in this paper. I have seen specimens only of *nimbata* and *paraceylanica* from the Krakataus. The earlier records of *ceylanica*, *contingens*, and *anceps* from these islands are questionable.

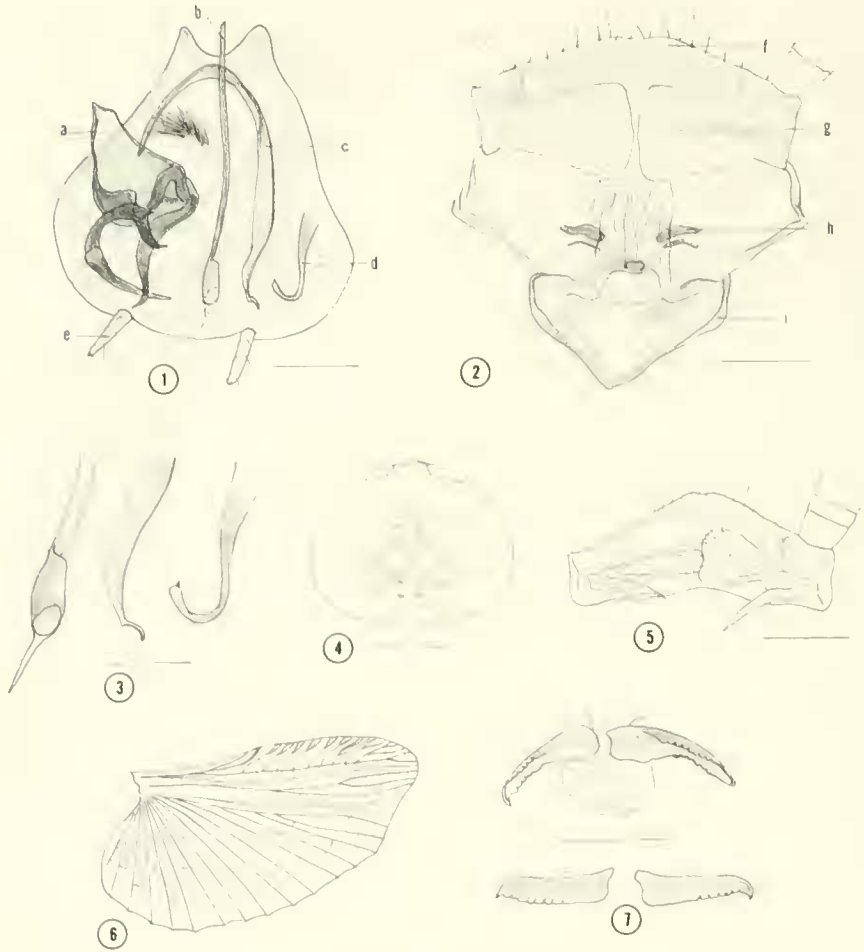
- Head with an orangish macula on vertex between the antennal sockets blending into the rest of the lighter face (Fig. 47). Pronotal disk light brown without distinct markings (Fig. 53) *contingens*
- 4. Interstyler region a subrectangular plate with short robust spines on posterior margin (Fig. 29). Front femur Type B₃ (Fig. 34). Wings shorter than the tegmina, sometimes vestigial *perspicillaris*
- Interstyler region not as above. Front femur Type B₂. Tegmina and wings fully and equally developed 5
- 5. Tegmina with a dark brown macula on basal region (Fig. 41), sometimes extending the full length of the wing cover *anceps*
- Tegmina without dark markings 6
- 6. Apex of median genital phallobes terminating in a pair of heavy spinelike structures (Figs. 18, 23, 26) *nimbata*
- Apex of median genital phallobes slender, acute (Fig. 10) *paraceylanica*

DESCRIPTIONS OF SPECIES OF
MARGATTEA

Margattea ceylanica (Saussure)
Figs. 1–7

- Blatta ceylanica* Saussure 1868: 355 (♀); 1869: 247; Walker 1871: 20.
Allacta ceylanica (Saussure): Kirby 1904: 100.
Phyllodromia ceylanica (Saussure): Shelford 1908b: 12; Dammernan 1948: 483.
Margattea ceylanica (Saussure): Shelford, 1911: 155; Rehn 1931: 302, fig. 1; Hanitsch 1933a: 232; 1933b: 310; 1934: 118; 1936: 392; Bruijning 1947: 221; 1948: 62; Bey-Bienko 1957: 899; Princis 1969: 862 (references to generic combinations and records; incorrectly included *M. nimbata* as a synonym); Asahina 1979: figs. 69–71.

Material examined.—Sri Lanka. (MNHG): holotype female of *Blatta ceylanica*, Peradenia, “Ceylan.” (ANSP): The following specimens were determined by Hebard as *M. ceylanica* (Sauss.) and many were labelled topotypes: Belihuloya, 1 ♂ (terminalia slide 398), I.ix.1928; Bibile Estate, 1



Figs. 1-7. *Margattea ceylanica* (Saussure) from Sri Lanka. 1, 3-6, males from Udahamulla, and 7, from Battaramulla, 2, female from Labugama: 1, subgenital plate and genitalia (dorsal); 2, supraanal plate and genitalia (ventral); 3, distal ends of median, accessory median, and hooklike right genital phallomeres; 4, pronotum; 5, supraanal plate and paraprocts; 6, hind wing; 7, tarsal claws. Abbreviations: a, left phallomere; b, median phallomere; c, accessory median phallomere; d, hooklike right phallomere; e, style; f, supraanal plate; g, paraproct; h, intercalary sclerite; i, first valvifer. Scales (mm): 1, 2, 0.5; 3, 0.25; 4, 1.0; 5, 0.5; 6, 2.0; 7, 0.15.

♂, 26.vii.1929; Wellaway, 1 ♂, 28.iv.1931; Rakwana, 1 ♀, 3.v.1929; Horawupotana, 1 ♂, 1 ♀, 13.x.1924; Labugama, 1 ♂, 2 ♀ (1 with genitalia slide 404), 15-18. viii.1932; Woodside, Urugalla, 2 ♂, 22.iv.1924; Battaramulla, W.P., 1 ♂, 20.v.1931; Udahamulla, W.P., 1 ♂ (terminalia slide 399), ix.1926.

Male.—Interocular space decidedly less than distance between antennal sockets.

Tegmina and wings fully developed; hind wing with costal veins clubbed, cubitus vein with 2 complete and 0 incomplete branches, apical triangle small (Fig. 6). Pronotum sub-oval (Fig. 4). Abdominal terga unspecialized. Anteroventral margin of front femur Type B₂ (with 3 or 4 large spines on proximal half); tarsal claws weakly serrated (Fig. 7; serrations sometimes difficult to see under binocular microscope). Supraanal plate

transverse, hind margin trigonal, apex sometimes weakly indented; paraprocts dissimilar (Fig. 5). Subgenital plate almost symmetrical, styles similar, cylindrical, interstylar margin weakly convex (Fig. 1). Genitalia as in Figs. 1 and 3; hooklike right phallomere with a small apical spine; apex of median phallomere enlarged, the swollen portion terminating in a transparent filament; apex of accessory median sclerite narrow and slightly curved; left phallomere with spinelike processes.

Coloration.—Light brown. Vertex with dark brown band connecting eyes at top of head, occiput pale, whitish band along eye margins between tops of antennal sockets followed by a light transverse band, below this a pair of light brown spots. Pronotal disk with brown pattern as in Fig. 4, the remainder of pronotum hyaline. Tegmina hyaline without markings. Abdominal terga infuscated, with light brown medial areas. Abdominal sterna light brown with small dark maculae laterally, and some infuscation on lateral borders. Legs pale without dark markings. The markings are variable; the pronotal pattern may be intense or subobsolete, with gradations in between; also the amount of tergal infuscation and the size of the sternal maculae varies.

Female.—Supraanal plate transverse, hind margin weakly convex, medially weakly concave (Fig. 2). Genitalia as in Fig. 2; intercalary sclerites greatly reduced.

Measurements (mm) (♀ in parentheses). Length, 8.0–9.2 (7.8–8.9); pronotum length × width, 2.1–2.2 × 2.8–3.2 (2.1–2.3 × 3.0–3.2); tegmen length, 9.1–10.5 (8.7–10.1).

Comments.—This species was not collected on the 1984/85 Krakatau expeditions. Dammerman (1948: 483), and Buijning (1948: 62) recorded it from Krakatau, the latter from a single female collected in May, 1908. Princis (1969: 862) listed the species from Ceylon, Java, Borneo, and Krakatau (probably based on the above two authors). Most likely the Krakatau records were misidentifications and

referred to *M. nimbata* (see remarks under that species), or *M. paraceylanica*.

Asahina (1979) illustrated the terminal abdominal segments and right hooklike genital phallomere (which he incorrectly labelled the left phallosome) (his figs. 69, 70) of a Sri Lankan specimen which he determined as *M. ceylanica* with a query. His drawings of these structures agree with the specimens of *ceylanica* which I have illustrated here.

Margattea paraceylanica Roth

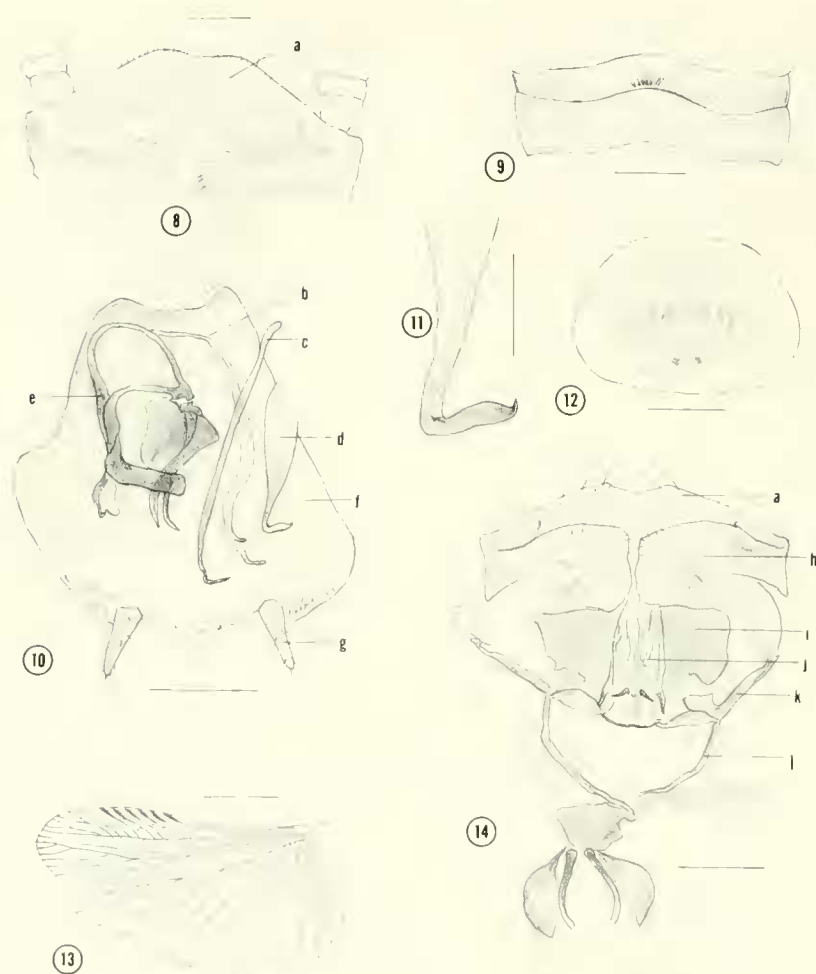
NEW SPECIES

Figs. 8–14

Holotype.—Male, Rakata, Krakatau Islands, 200 m, s. face, 24.viii.1985, Zool. Exp. Krakatau.

Paratypes.—Krakatau Islands: Rakata, Zwarte Hoek, 850 ft., ridge, water trap, 1 ♂ (terminalia slide no. 3), 1984; 6.09S 105.25E, under rocks, 1 (abdomen missing), 1 ♀ (genitalia slide no. 4), 6.ix.1984; Rakata, s. face, 200 m, 1 ♀, 400 m, 1 nymph, 24.viii.1985; Panjang, 6.05S 105.28E, ex litter, 1 ♀, 14.ix.1984, 1 ♀, beating, 20.ix.1984; Sertung, 6.04S 105.24–25E, spit, transition zone, swcep, 1 ♂, 18.viii.1985. [All specimens were collected on the 1984 and 1985 expeditions to the Krakatau Islands. The holotype and some of the paratypes are deposited in the Zoological Museum, Bogor, W. Java. Some specimens will be kept at (TUVA).]

Male.—Pronotum subelliptical (Fig. 12). Tegmina and wings fully developed extending beyond end of abdomen. Hind wing with costal veins thickened distad, cubitus with 4 complete and 0 incomplete branches, apical triangle very small (Fig. 13). Anterovenral margin of front femur Type B₂ (with 3 or 4 large proximal spines); tarsal claws symmetrical, minutely serrated, pulvilli on 4 proximal tarsomeres, arolia present. Eighth abdominal tergum with a postero-medial tuft of setae, hind margin concave (Fig. 9). Supraanal plate transverse, hind



Figs. 8–14. *Margattea paraceylanica* Roth, paratypes from Rakata. 8–13, male: 8, supraanal plate and paraprocts (ventral); 9, abdominal terga 8 and 9; 10, subgenital plate and genitalia (dorsal); 11, hooklike right phallomere; 12, pronotum; 13, hind wing; 14, female, supraanal plate and genitalia (ventral). Abbreviations: a, supraanal plate; b, accessory median phallomere; c, median phallomere; d, right phallomere; e, left phallomere; f, subgenital plate; g, style; h, paraproct; i, intercalary sclerite; j, ovipositor valve; k, paratergite; l, first valvifer. Scales (mm): 8–10, 0.5; 11, 0.15; 12, 1.0; 13, 2.0; 14, 0.5.

margin weakly concave medially; right and left paraprocts weakly defined, similar (Fig. 8). Subgenital plate weakly asymmetrical, styles similar, cylindrical, interstyler margin weakly convex (Fig. 10). Genitalia as in Fig. 10; apex of hooklike right phallomere acute, without an apical or preapical spine;

the tip looks like a spine but it is not articulated (Fig. 11); median phallomere slender throughout; associated median phallomere with a small preapical branch; left phallomere with spinelike processes.

Coloration (specimens originally preserved in alcohol, then pinned and dried).—

Light brown. Head with dark band on vertex extending as faint stripes on occiput. Pronotal disk with light symmetrical spots and lines (variable in intensity), surrounding regions mostly hyaline (Fig. 12). Tegmina hyaline, humeral region colorless, remainder light brown; hind wings appear colorless but when mounted on a white card the apical region of the anterior field has a faint yellowish tinge.

Female.—Supraanal plate (Fig. 14) similar to that of the male (Fig. 8). Subgenital plate extends well beyond hind margin of supraanal plate. Genitalia as in Fig. 14; intercalary sclerites very large dark plates that extend laterally well beyond ovipositor valves, first valvifer slender rods without swellings.

Measurements (mm) (♀ in parentheses). Length, 6.8–8.0 (7.3–8.5); pronotum length × width, 2.0–2.1 × 2.7–3.0 (2.2 × 2.9–3.0); tegmen length, 7.2–8.6 (7.3–7.9).

Comments.—The male genital phallobes and female genitalia clearly show a close relationship to *ceylanica*. Although the subgenital plate and styles are similar in both *paraceylanica* and *ceylanica*, the former has a tergal gland on T8 which is lacking in the latter. The female genitalia of both taxa are distinctly different. It is likely that *paraceylanica* occurs on other Indonesian islands.

Margattea nimbata (Shelford)

Figs. 15–26

Phyllodromia nimbata Shelford 1907b: 31 (♂ ♀); 1908b: 13; Hanitsch 1915: 57; 1923b: 410.

Margattea nimbata (Shelford): Hanitsch 1928: 23; 1929a: 13; 1931b: 392; 1932a: 5; 1933b: 310 (incorrectly synonymized with *ceylanica*); Bruijning 1947: 221; 1948: 62; Princis 1969: 863 [Bruijning and Princis accepted Hanitsch's synonymy].

Kuchinga nimbata (Shelford): Hebard 1929: 42.

Material examined.—Lectotype (here designated). Male (terminalia slide 200). Kuching, N.W. Borneo [Sarawak], pres. 1905 by Sarawak Museum, 15.xii.1898. Type Orth. 89 1/4 in (HDEO). Paralectotypes. Sarawak. (HDEO): 2 ♀ (genitalia slides 201 and 203), same locality as lectotype, Dyak coll. pres. 1900 by R. Shelford, 25.i.1900 and 27.vii.1900, Type Orth. 89 3/4 and 89 4/4.

Additional material.—Krakatau. (RNHL): 1 ♂ (terminalia slide 139) 1 ♀ (with rotated ootheca, keel to right, Fig. 25) (det. as *Margattea ceylanica* by Hanitsch); 1 ♀, v.1908, E. Jacobson (labelled *M. ceylanica*).

Australia (Northern Territory). (BPBM): Holmes Jungle, Palm Cr., 15 km NE of Darwin, 5 m, 2 ♂ (1 with terminalia slide 468), 1 (abdomen missing), light trap, 11.iii.1961, 1 ♂, 14.iii.1961, J. L. and M. Gressitt.

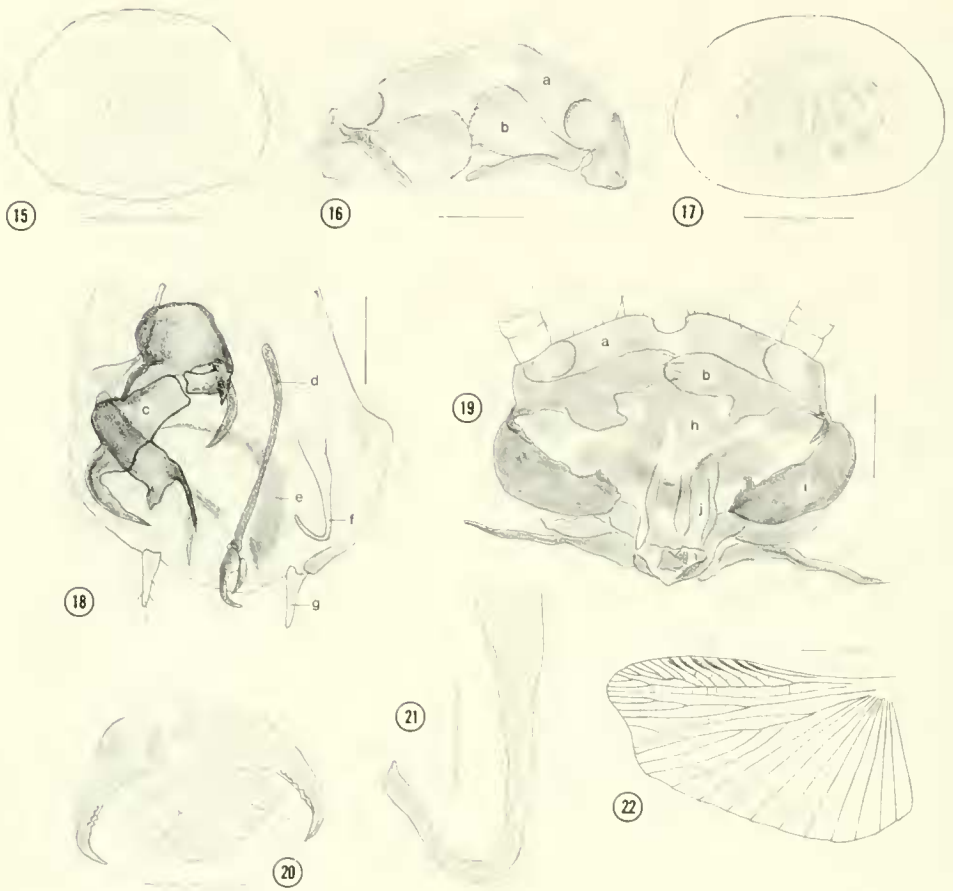
Kei Island. (RNHL): 3 ♀, 1922, H. C. Siebers (labelled *Phyllodromia nimbata* Shelf., by Hanitsch).

Christmas Island (Indian Ocean). (ANIC): National Park, 1 ♂ (terminalia slide 210), 2 ♀, 3 nymphs, x.1983, L. Hill [ANPWS].

Thailand. (ZILS): 30 km south of Pak Thong Chai, 2 ♂, 1 ♀ (reared from ♀ taken in a dry stream bed) (det. as *M. ceylanica* by Princis), 13.iv.1967, 1 ♂, 14.iv.1967, 2 ♀ (on shrubbery at night), 26.iv.1967 (det. as *M. ceylanica* by Princis), 1 ♂ (reared from ♀ taken on shrubbery at night) [det. as *Margattea punctulata* (Brunner) by Princis], 26.iv.1967, L. M. Roth.

Sarawak. (ANSP): Kapit, 1 ♀ (terminalia slide 405), 9.vii.1910, Wm. Beebe [reported as *Kuchinga nimbata* (Shelford), by Hebard, 1929:42]. (NRSS): Medan, 5 ♂, 1 (abdomen missing), Mjoeberg (labelled *Phyllodromia* or *Margattea nimbata* Shelf., by Hanitsch); Tjinta Radja, 1 ♀, Mjoeberg (labelled *Phyllodromia nimbata* Shelf., by Hanitsch).

Borneo (Kalimantan). (NRSS): Tandjong, Redeb, O. Borneo, 3 ♂ (1 with terminalia slide 67) (labelled *Margattea ceylanica* Sauss., by Hanitsch), 2 ♀ [1 with rotated ootheca and labelled *Margattea ceyl-*



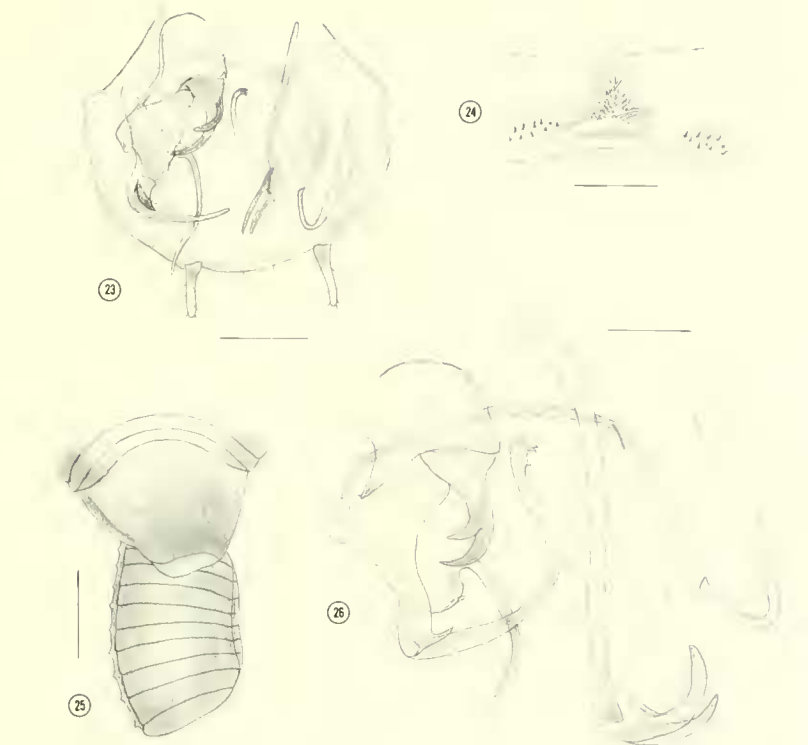
Figs. 15–22. *Margattea nimbata* (Shelford). 15, 16, 18, 20, 21, male lectotype, 17, 19, female paralectotype, 22, female from Kapit, Sarawak: 15, pronotum; 16, supraanal plate and paraprocts (ventral); 17, pronotum; 18, subgenital plate and genitalia (dorsal); 19, supraanal plate and genitalia (ventral); 20, tarsal claws and arolium; 21, right phallomere; 22, hind wing. Abbreviations: a, supraanal plate; b, paraproct; c, left phallomere; d, median phallomere; e, accessory median phallomere; f, right phallomere; g, style; h, intercalary sclerite; i, paratergite; j, ovipositor valve. Scales (mm): 15, 1.0; 16, 0.5; 17, 1.0; 18, 19, 0.5; 20, 21, 0.15; 22, 2.0.

lanica Sauss. (= *M. nimbata* Shelf.), by Hanitsch], (ZILS): Pelawan besar. 1 ♀ (det. as *M. ceylanica* by Princis), vi.1937, Mrs. M. E. Walsh.

Java. (RNHL): Ardja Sari, Preanger, 1 ♀ (det. as *M. nimbata* by Bruijning 1949).

Male.—Interocular space less than distance between antennal sockets. Pronotum subelliptical (Fig. 15). Tegmina and wings fully developed, extending beyond end of abdomen. Hind wing with subcosta and costal veins clubbed distad, discoidal and median veins straight, unbranched; cubitus vein

straight with 2–5 complete and 0 incomplete branches, apical triangle small (Fig. 22). Front femur Type B₂ (with 3–5 large proximal spines); pulvilli present on 4 proximal tarsomeres, tarsal claws symmetrical with subobsolete denticles on ventral margins (Fig. 20), arolia present. Eighth abdominal tergum medially concavely arched and bearing posteromedially a group of setae (tergum 8 in the lectotype is damaged, but the specialization is visible in other males) (Fig. 24). Supraanal plate transverse, convexly rounded, apex of hind margin weakly



Figs. 23–26. *Margathea nimbata* (Shelford). 23–25, from Krakatau; 23, male subgenital plate and genitalia (dorsal); 24, male, setal modification on eighth abdominal tergum; 25, female with rotated ootheca attached to terminal segments (ventral); 26, male from Northern Territory of Australia, genital phallomeres (dorsal). Scales (mm): 23, 0.5; 24, 0.25; 25, 1.0; 26, 0.25.

excavated, reaching to about hind margin of subgenital plate; right and left paraprocts similar (Fig. 16). Subgenital plate subsymmetrical, styles similar, cylindrical, interstyler margin weakly convex, accessory stylelike structures absent (Figs. 18, 23). Genitalia as in Figs. 18, 21, 23, 26; left phallomere large and complex with spinelike processes; apex of median phallomere with a pair of spinelike structures (visible in pinned specimens), accessory median sclerite present; hooklike right phallomere without a subapical or apical spine.

Coloration.—Yellowish or light brown. Head with pale occiput, a reddish transverse band on vertex, sometimes with a lighter brown interocellar band. Pronotal disk yellowish brown with symmetrical reddish or light brown dots and lines, surrounding area

mostly hyaline (Fig. 15). Tegmina hyaline, pale brown; hind wing with clubbed region of costal veins dark, remainder essentially not infuscated (Fig. 22). Abdominal terga pale with narrow dark brown transverse bands along anterior margins of segments that do not reach lateral bands, narrow posterior segmental bands connect with broad lateral infuscation; supraanal plate with a pair of dark brown spots on posterior half separated by a narrow whitish spot behind the concave apex, basal half of segment yellowish brown (Fig. 16). Abdominal sterna pale with broad lateral dark brown borders that become narrower on posterior segments; subgenital plate pale except for narrow dark interstyler margin. Cerci with basolateral area of segment 8 and most of segment 9 dark brown, remainder (includ-

ing 3 terminal segments) pale (cercal color varies and the dark areas may be practically absent).

Female.—Supraanal plate transverse, hind margin with a distinct narrow, concave excavation (Fig. 19). Genitalia as in Fig. 19; sclerites very darkly pigmented, paratergites very wide. Pronotal disk markings similar to, or more pronounced than in male (Fig. 17). Ootheca as in Fig. 25.

Measurements (mm) (♀ in parentheses). Length, 7.2–9.0 (8.0–9.6); pronotum length × width, 2.0–2.5 × 2.5–3.3 (2.2–2.5 × 3.0–3.4); tegmen length, 7.7–10.3 (7.3–10.1).

Comments.—Hebard (1929: 42) suggested that *nimbata* may be a pale form of *obtusifrons* Walker, but Hanitsch (1931b: 392) was correct in stating that these 2 species are distinct. The female genitalia of *nimbata* (Fig. 19) and *obtusifrons* (fig. 14L in Roth 1985b) differ. I have reexamined the type female of *Blatta obtusifrons* which has been placed in ?*Kuchinga* (Hebard 1929), *Symploce* (Princis 1969: 9) and sp. incertae sedis (Roth 1985b: 156). The female's front legs are missing but the tarsal claws on 2 other intact legs are minutely toothed. The male's front femur is Type B₃ [with 5 large proximal spines, then 2 short heavy spines the same length as the following piliform spinules, terminating in 3 large spines; this type of armament is intermediate between Type A and Type B, and I incorrectly stated it was Type A₃ (Roth 1985b)]. The tarsal claws of the male are minutely but distinctly toothed so I am placing *obtusifrons* in *Margattea*.

Hanitsch (1931b: 392) suspected that *nimbata* was a synonym of *ceylanica*, but he retained the former name because he had not seen the type of *ceylanica*. Later, he (Hanitsch 1933b: 310) claimed to have confirmed this synonymy. Bruijning (1947, 1948) and Princis (1969) listed *nimbata* as a synonym of *ceylanica*. Superficially the two species resemble one another, but the male and female genitalia of *ceylanica* and *nimbata* are distinctly different (cp. Fig. 1

with 18, 23, 26, and Fig. 2 with 19). *Margattea nimbata* is very widely distributed. *Margattea ceylanica* is only known from Sri Lanka, and all records of this species outside of that island probably refer to *nimbata*.

One female paralectotype (Type Orth. 89 2/4) in (HDEO) of *nimbata* (supraanal plate and part of genitalia on slide 202) with the same data as the other paralectotypes probably is another species. Unfortunately most of the genitalic structures were lost during slide preparation. However, the hind margin of the supraanal plate lacks the distinctive medial indentation, and the intercalary sclerites and remnant of the paratergites differs from those of *nimbata*.

Margattea perspicillaris (Karny)

NEW COMBINATION

Figs. 27–35

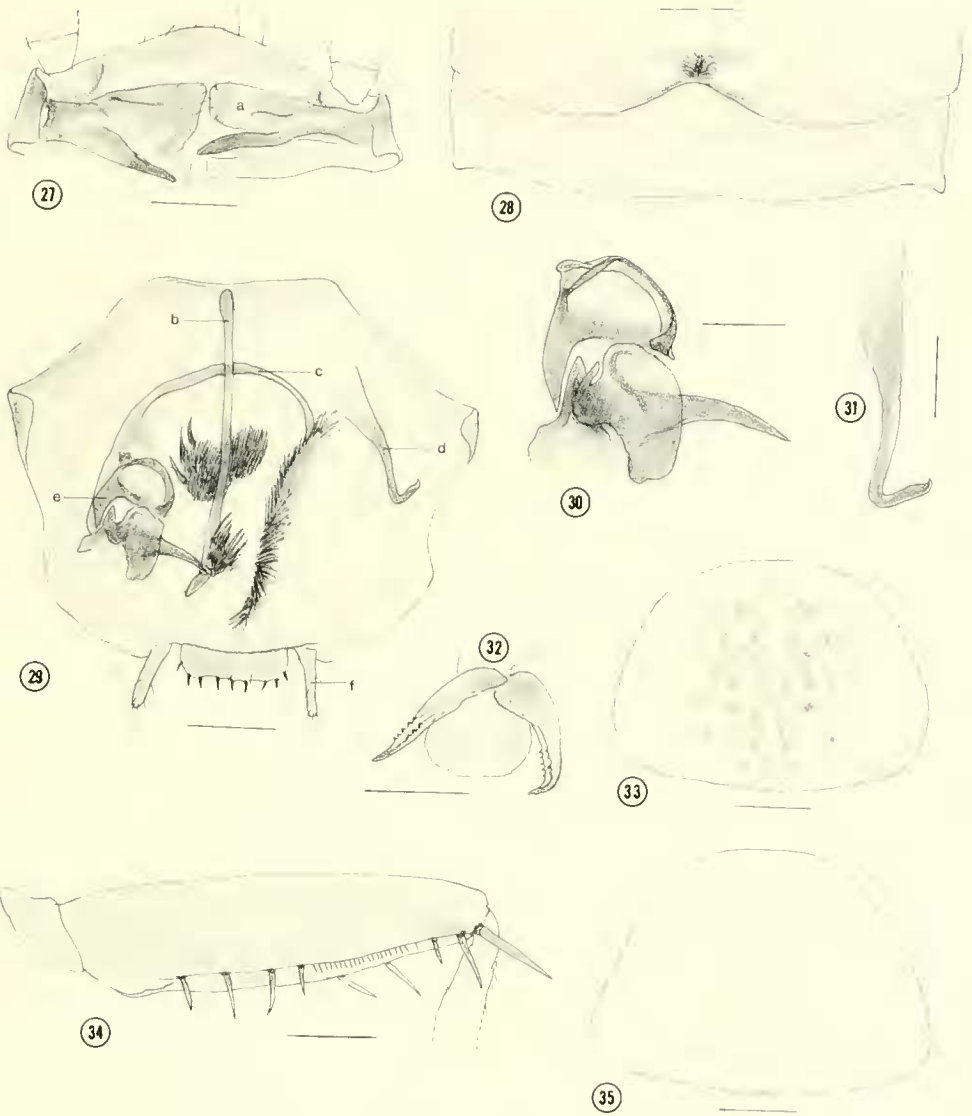
Theganopteryx perspicillaris Karny 1915: 103 (♂ ♀); Hanitsch 1927: 33; Shiraki 1931: 209, Princis; 1969: 1012 (sp. incertae sedis).

Theganosilpha perspicillaris (Karny): Kumar and Princis 1978: 33, figs. 27, 28; Asahina 1979: 114, figs. 11–13, 25, 43–50, 60.

Material examined.—Lectotype (labelled by Kumar 1977). Male, Hoozan, Formosa [Taiwan], 1910, H. Sauter; in (DEIG).

Paralectotypes. Taiwan. (DEIG): same data as lectotype, 2 ♂ (1 with terminalia slide 6), 1 ♀.

Male.—Pronotum subparabolic (Figs. 33, 35). Tegmina reaching slightly beyond end of abdomen. Hind wings vestigial, narrow, lateral, reaching between T1 and T2, sometimes longer with venation. Front femur Type B₃, tarsal claws minutely serrated, the teeth visible under dissecting microscope (Figs. 32, 34). Eighth abdominal tergum with hind margin concavely indented medially with a posteromedial tuft of setae (Fig. 28), hidden under T7. Supraanal plate transverse, hind margin convex entire, or with a weak indication of a medial indentation;



Figs. 27–35. *Margattea perspicillaris* (Krauss), male types. 27–34, paralectotype: 27, supraanal plate and paraprocts (ventral); 28, abdominal terga 8 and 9; 29, subgenital plate and genitalia (dorsal); 30, left phallomere; 31, hooklike right phallomere; 32, tarsal claws and arolium; 33, pronotum; 34, front femur (anterolateral); 35, lectotype, pronotum. Abbreviations: a, paraproct; b, median phallomere; c, accessory median phallomere; d, hooklike right phallomere; e, left phallomere; f, style. Scales (mm): 27–29, 0.5; 30–31, 0.25; 32, 0.15; 33, 1.0; 34, 0.5; 35, 1.0.

paraprocts similar with a straight spinelike process (Fig. 27). Subgenital plate essentially symmetrical, convex, exposed sides and interstyler regions reflexed dorsad; styles similar, cylindrical, widely separated, be-

tween them a rectangular plate, corners rounded, with short robust spines on its hind margin (Fig. 29). Genitalia as in Fig. 29; hooklike right phallomere relatively small, without a preapical spine, apex acute, curved

(Fig. 31); left phallomere with a large spine-like process (Fig. 30); accessory median phallomere with a large setal brush.

Coloration.—Light brown. Head with a weak indication of an interocular band. Pronotal disk with distinct (Fig. 33) or faint (Fig. 34) markings, remaining portion hyaline.

Female.—Tegmina not reaching beyond end of abdomen, extending to about T9; hind wings vestigial. Supraanal plate short, transverse, hind margin broadly convex.

Measurements (mm) (♀ in parentheses). Length, 9.3–9.5 (11.5); pronotum length × width, 2.7–3.1 × 4.0–4.3 (3.0 × 4.5); tegmen length, 7.2–7.9 (7.7).

Comments.—The spined interstyler plate distinguishes the male of *perspicillaris* from the other species described in this paper.

Margattea anceps (Krauss)

Figs. 36–46

Blatta (*Phyllodromia*) *anceps* Krauss 1903: 749 (♀).

Blatta anceps Krauss: Kirby 1910: 563.

Phyllodromia anceps Krauss: Shelford 1908b: 14; Hanitsch 1915: 50; 1923b: 463.

Margattea anceps (Krauss): Caudell 1927: 12; Hanitsch 1928: 23 (incorrectly synonymized *nigrovittata* Hanitsch with *anceps*, see remarks below); 1929b: 276; 1932b: 61; 1933b: 310; 1933a: 232; Dammersman 1948: 483, 555; Bruijning 1948: 63; Princis 1969: 864.

Kuchinga anceps (Krauss): Hebard, 1929: 42 (♂).

Holotype (not examined). Female, Tjibodas, Java. (According to Krauss, the specimens he described in his paper were preserved "in Spiritus" in the Zoology Department of the "Universitäts-Institute zu Jena." Dr. D. v. Knorre of the Friedrich-Schiller-Universität zu Jena wrote me 28 May 1987 that the type of *anceps* is not in their museum. He also wrote me on 14 October 1987 that the type is not at the Zoological Institute in Tübingen where Krauss

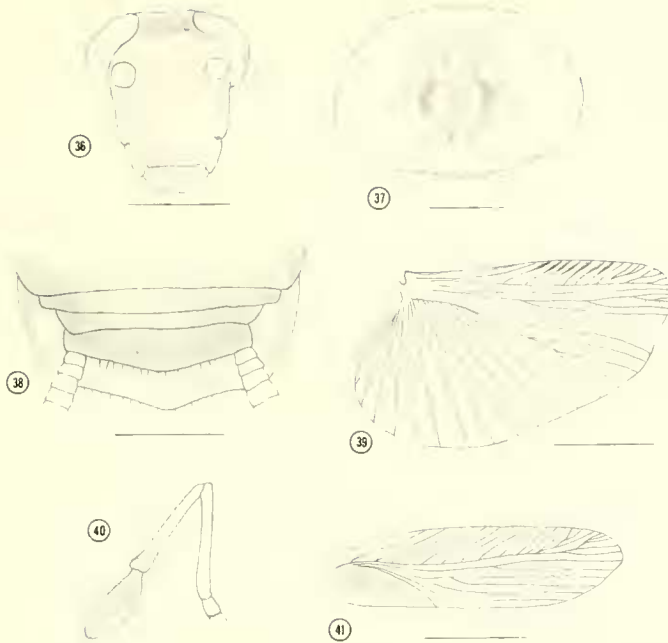
worked at that time and that the specimen probably no longer exists.)

Material examined.—Neotype (here designated). Male, Tjibodas, Java, 1500 m, viii.1921, Karny; in (RNHL).

Additional material. Java. (RNHL): same data as neotype, 2 ♂ (one with terminalia slide 141), 1400 m, 1 ♂ (terminalia slide 143), 3 ♀, viii.1921, 2 ♀, vi.1929, Karny; Panggerango, West Java, 1000 m, 1 ♀, 7.vi.1932, M. A. Lieftinck.

Male.—Interocular space less than distance between antennal sockets and ocelli. Pronotum flat, anterior and posterior edges almost straight, lateral edges convex (Fig. 37). Tegmina and wings fully developed. Hind wings with costal veins thickened on distal halves or clubbed apically, discoidal vein straight; median and cubitus veins straight, the former simple, the latter with 3 complete (1 may be forked) and 0 incomplete branches, apical triangle small (Fig. 39). Front femur Type B₂ (with 4 large proximal spines); pulvilli present on 4 proximal tarsomeres, tarsal claws symmetrical, ventral margins minutely toothed, arolia present. Eighth abdominal tergum with hind margin concavely indented and arched, bearing a tuft of setae (Fig. 43). Supraanal plate transverse, hind margin narrowly truncate medially, reaching to hind margin of subgenital plate; right and left paraprocts similar, without spine-like processes (Fig. 42). Subgenital plate subsymmetrical, exposed margin rounded, styles cylindrical, similar, separated by about their lengths, interstyler margin straight, accessory stylelike processes absent (Fig. 44). Genitalia as in Figs. 44–46; apex of hooklike right phallomere concavely excavated; median phallomere with a preapical branch, distal region broadened and terminating in a spine.

Coloration.—Head yellowish brown with a broad transverse dark brown band on vertex, occiput pale, sometimes with pale spots between antennal sockets and on face (Fig. 36). Pronotal disk with reddish brown symmetrical pattern (Fig. 37). Tegmina with



Figs. 36–41. *Margattea anceps* (Krauss), female from Panggerango, West Java: 36, head; 37, pronotum; 38, terminal abdominal segments (dorsal); 39, hind wing; 40, maxillary palps; 41, tegmen. Scales (mm): 36–38, 1.0; 39, 4.0; 40, 0.5; 41, 4.0.

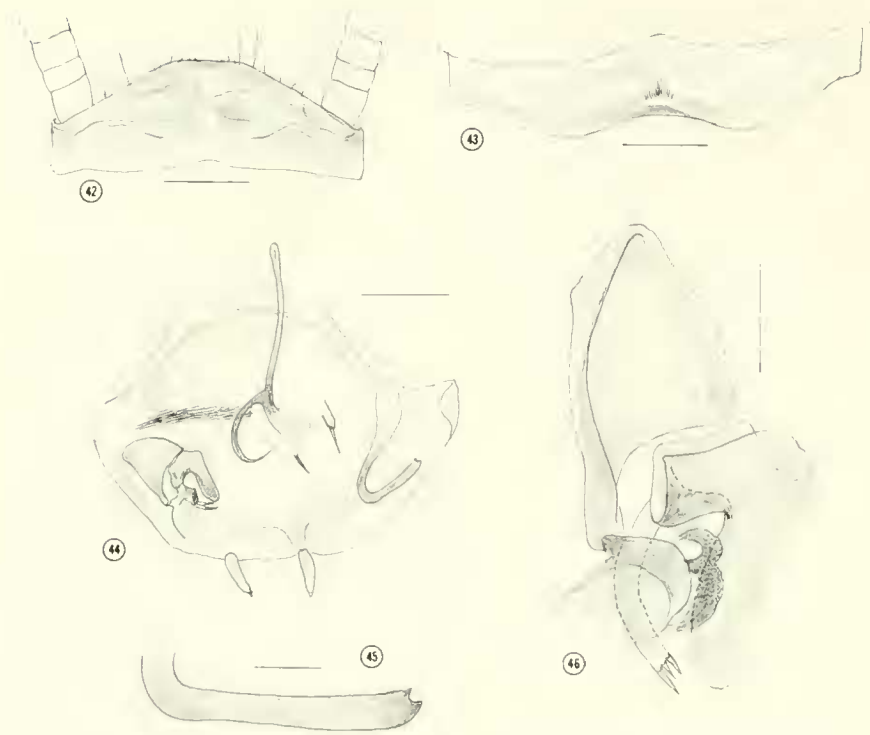
dark brown on basal portion; that part of the right tegmen covered by the left may be darkened whereas the similar area on the left tegmen is pale; the extent of dark areas on the tegmina varies from a small region, e.g. Fig. 41, to large areas extending the length of the wing cover. Abdominal terga light to dark brown, if the former with dark infuscation along posterior borders of the segments; tergal gland area on T8 and posterior part of T7 pale, supraanal plate with a small pale dot on posteromedial region near the hind margin. Abdominal sterna light or dark brown; pale specimens may have a small dot and some infuscation laterally. Cerci pale dorsally. Legs pale.

Female.—Interocular space about the same as interocellar distance, less than the space between antennal sockets (Fig. 36). Supraanal plate transverse, hind margin weakly convex, not reaching hind margin of subgenital plate which is large and laterally

overlaps several of the abdominal terga (Fig. 38). Pronotum as in Fig. 37. Tegmina and wings (Figs. 39, 41), and maxillary palps (Fig. 40) as in male. Abdominal terga and sterna very dark brown, subgenital plate with a large mediobasal yellowish spot.

Measurements (mm) (♀ in parentheses). Length, 8.5–10.0 (9.0–10.1); pronotum length × width, 2.2 × 3.0–3.1 (2.2–2.4 × 3.1–3.2); tegmen length, 11.0–12.0 (11.0–11.8).

Comments.—Although the holotype of *M. anceps* apparently is lost, the present material is from the same locality (Tjibodas) and the females agree closely with Krauss's description of that sex. Hanitsch synonymized *M. nigrovittata* (Hanitsch) with *anceps*, probably because of the tegminal markings and interocular band in both taxa. Nevertheless, tegmina with brownish markings and interocular bands occur in species other than *anceps*. I have seen the types of



Figs. 42-46. *Margattea anceps* (Krauss), male from Tjibodas, Java: 42, supraanal plate and paraprocts (ventral); 43, abdominal tergum 8; 44, subgenital plate and genitalia (dorsal); 45, distal part of right genital phallomere; 46, left genital phallomere. Scales (mm): 42-44, 0.5; 45, 0.1; 46, 0.15.

nigrovittata and the male's styles and genitalia differ markedly from those of *anceps*. Both are valid species.

***Margattea contingens* (Walker)**

Figs. 47-61

Blatta contingens Walker 1868: 229 (♀).

Phyllodromia contingens (Walker): Kirby 1904: 92; Shelford (1906) 1907a: 490; 1908a: 27; 1908b: 13; Hanitsch 1915: 45; 1923a: 198; 1923b: 402; Dammerman 1929: 112; 1948: 483.

Blattella contingens (Walker): Dammerman 1922: 107; Karny 1925: 188, fig. 20.

Kuchinga contingens (Walker): Hebard 1929: 45.

Margattea contingens (Walker): Hanitsch 1929a: 13; 1936: 392; Bruijning, 1948: 63.

Blatta humeralis Walker 1869: 140 (♂); Hanitsch 1915: 45.

Phyllodromia humeralis (Walker): Kirby 1904: 91; Shelford (1906) 1907a: 490, pl. 30, fig. 4 (synonymized with *contingens*); 1908b: 13; Hanitsch 1923a: 198.

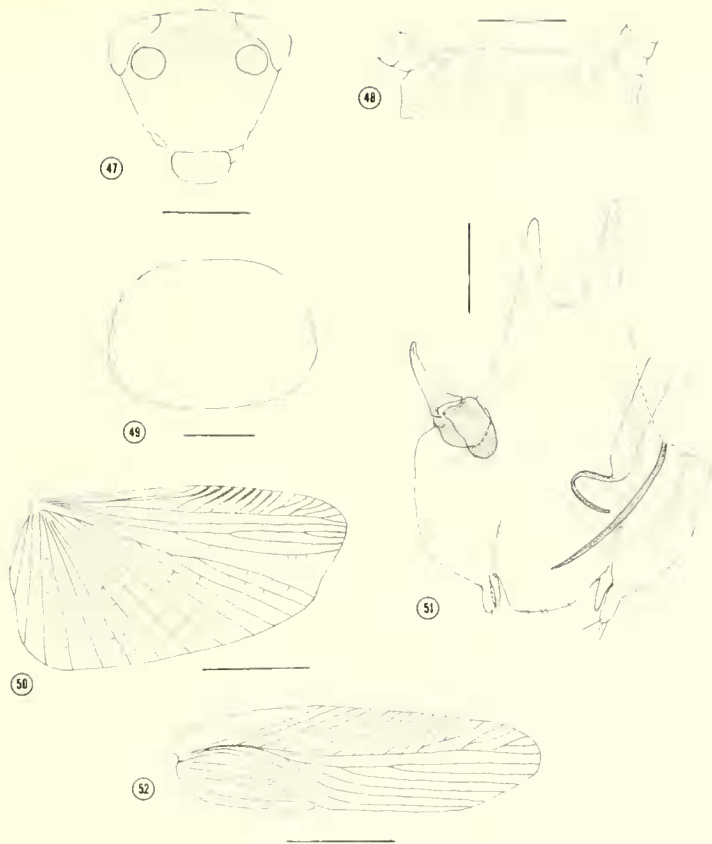
Kuchinga humeralis (Walker): Hebard 1929: 45.

Margattea humeralis (Walker): Hanitsch 1928: 21 (*contingens* and *humeralis* are distinct taxa); Bruijning 1948: 64; Princis 1950: 174.

Phyllodromia abrupta Hanitsch 1923b: 399, figs. 2, 3 (♀).

Margattea abrupta (Hanitsch) 1928: 21 (synonymized with *humeralis*); Bruijning 1948: 64.

Material examined.—Holotype. Female (genitalia slide 204) of *Blatta contingens*,



Figs. 47–52. *Margattea contingens* (Walker), male from Long Petak, Borneo: 47, head; 48, supraanal plate and paraprocts (ventral); 49, pronotum; 50, hind wing; 51, subgenital plate and genitalia (dorsal); 52, tegmen. Scales (mm): 47, 1.0; 48, 0.5; 49, 1.0; 50, 3.0; 51, 0.5; 52, 3.0.

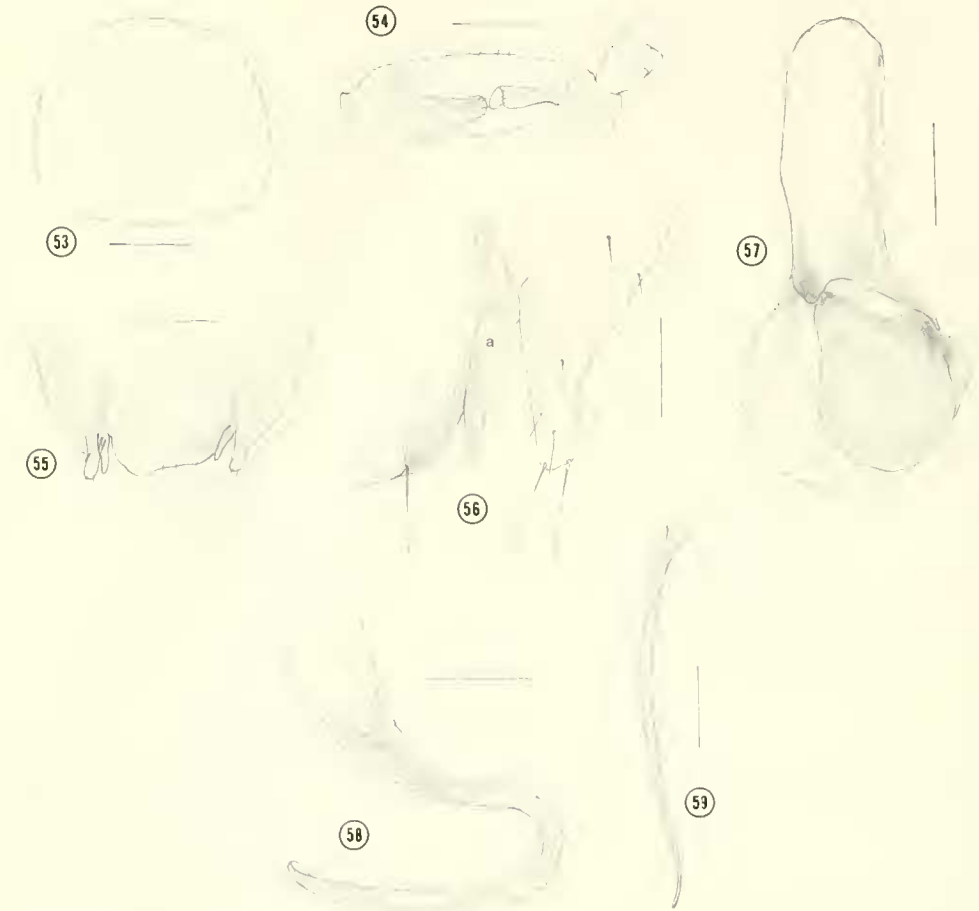
Sarawak, Wallace, coll. (1830–73), W. W. Saunders, purchased and pres. '73 by Mrs. F. W. Hope; Type Orth. 77 (HDEO).

Singapore. (HDEO): Male (terminalia slide 199) holotype of *Blatta humeralis*, Wallace, E. coll. (1830–73), W. W. Saunders, purchased and pres. '73 by Mrs. F. W. Hope, Type Orth. 78.

Borneo. (RNHL): Long Petak, 450 m, 1 ♂ (terminalia slide 145), 2 ♀ (1 with genitalia slide 146), ix.1925, H. C. Siebers, M. O. Borneo Exp.

Male.—Interocular space about the same as distance between the antennal sockets (Fig. 47). Maxillary palps with third segment slightly longer than the fourth, each distinctly longer than the fifth. Pronotum

suboval (Figs. 49, 53). Tegmina and wings fully developed extending well beyond end of abdomen. Hind wing with costal veins weakly thickened distad, median vein simple, cubitus vein straight with 3 complete and 0 incomplete branches, apical triangle small (Fig. 50). Front femur Type B₂ (with 5 proximal spines). Eighth abdominal tergum unspecialized. Supraanal plate transverse, rectangular, hind margin truncate not reaching hind margin of subgenital plate; right and left paraprocts similar (Figs. 48, 54). Subgenital plate weakly asymmetrical, lateral corners produced, stylelike (not articulated), styles similar, cylindrical, each arising basally on the inner margin of the lateral projections (appear to be 4 styles),

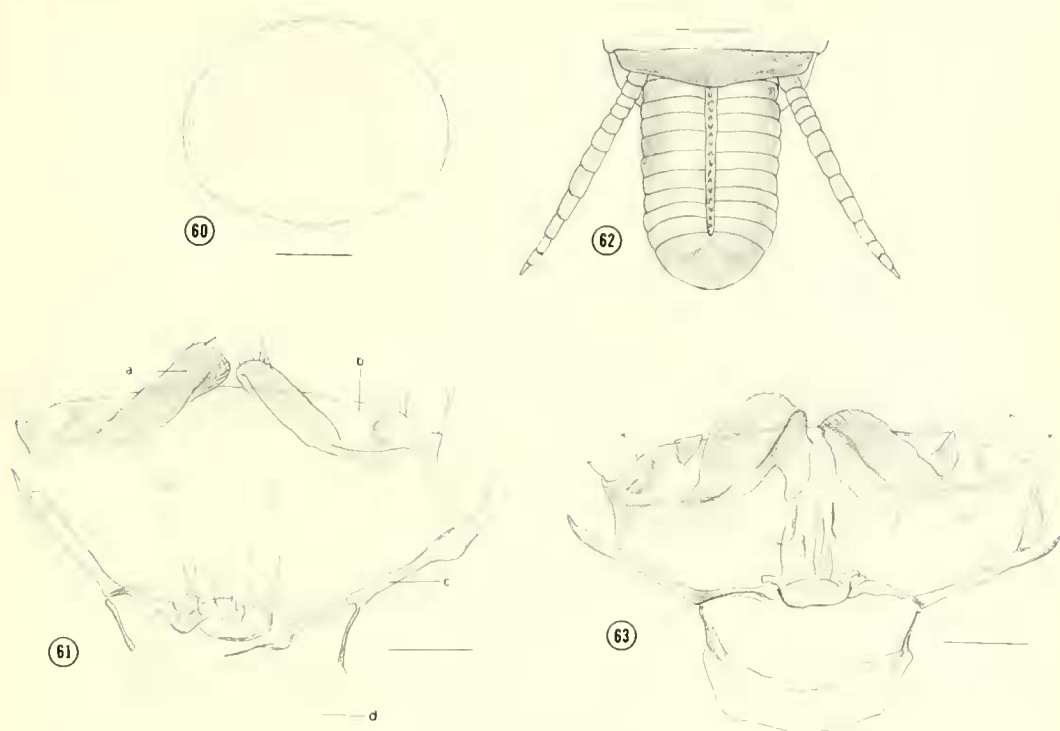


Figs. 53–59. *Margattea contingens* (Walker), male holotype of *Blatta humeralis* Walker: 53, pronotum; 54, supraanal plate and paraprocts (ventral); 55, distal region of subgenital plate showing hind margin and styles (dorsal); 56, right posterior corner of subgenital plate; 57–59, left, right, and median genital phallomeres. Abbreviation: a, style. Scales (mm): 53, 1.0; 54, 55, 0.5; 56–58, 0.15; 59, 0.25.

interstylar margin slightly asymmetrical, not or only slightly produced beyond the tips of the styles (Figs. 51, 55, 56). Genitalia as in Figs. 51, 57–59; hook on right side, strongly curved, apex rounded without an apical spine or incision; the median phallomere is a slender, tapering, apically acute rod lying on the right side near the hook (generally the median phallomere lies more or less between the right and left phallomeres; I was careful not to move this structure during slide preparation so its position as shown in Fig. 51 may be normal); left phallomere bulbous on basal half.

Coloration.—Head with an orangish macula on vertex to between the antennal sockets blending into the lighter facial area (Fig. 47). Pronotal disk light brown without distinct markings, surrounding regions hyaline (Figs. 49, 53). Tegmina very pale, yellowish hyaline with a dark streak along the radial vein (this mark may be reduced and only indicated at the base of the vein; Fig. 52). Hind wing infuscated (Fig. 50). Abdominal terga light brown, edges pale. Abdominal sterna lighter, edges darker. Cerci pale dorsally and ventrally.

Female.—Pronotum as in Fig. 60. Su-



Figs. 60–63. *Margattea* spp. 60, 61, *M. contingens* (Walker), female holotype: 60, pronotum; 61, supraanal plate and genitalia (ventral); 62, 63, *M. longecalata* (Brunner), females: 62, from 10 miles south of Kuching, Sarawak, ootheca attached to the end of the female abdomen (dorsal); 63, from Sandakan, Sabah, supraanal plate and genitalia (ventral). Abbreviations: a, paraproct; b, supraanal plate; c, paratergite; d, first valvifer. Scales (mm): 60, 1.0; 61, 0.5; 62, 1.0; 63, 0.5.

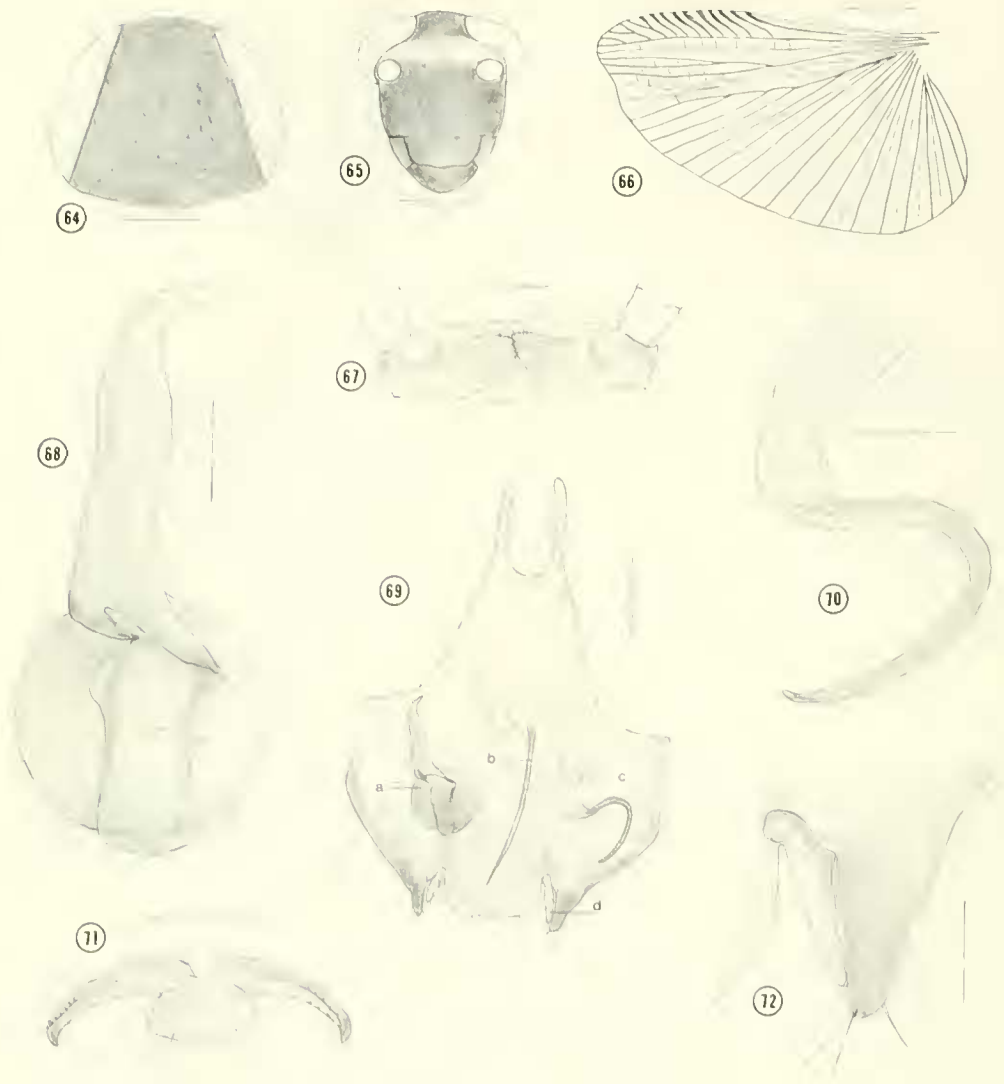
praanal plate strongly transverse, short, rectangular, hind margin entire (Fig. 61). Genitalia as in Fig. 61; paratergites slender, first valvifer broad, enlarged, connected to the paratergites by slender sclerotizations. Dark streak on radial vein of tegmina greatly reduced. Hind wings lightly infuscated.

Measurements (mm) (♀ in parentheses). Length, 7.4–9.6 (7.7–9.5); pronotum length × width, 2.2–2.4 × 3.1–3.2 (2.3–2.7 × 3.0–3.5); tegmen length, 10.4–10.5 (11.0–12.0).

Comments.—Shelford (1907a: 490) synonymized *humeralis* (♂) with *contingens* (♀). Hanitsch initially agreed with him but later (Hanitsch 1928: 27) considered both species distinct, basing his conclusion on the presence of a brown streak along the radial vein of the tegmen of *humeralis*, and absent in

contingens. Hebard (1929: 45) agreed with Hanitsch. I do not believe that this color difference is sufficient to separate these two taxa. In the male *contingens* from Long Petak Borneo, the streak on the tegmen is subobsolete, but the important characters (absence of a tergal gland, genital phallomeres, subgenital plate, and styles) are so similar to the holotype of *humeralis* that I am certain they are the same taxon. Also the females from Long Petak are very similar to the ♀ holotype of *contingens* from Singapore.

Although *M. longecalata* is strikingly different in coloration from *contingens* the male characters, so similar in both taxa, leave no doubt they are very closely related. The female genitalia of *contingens* (Fig. 61) also



Figs. 64-72. *Margattea longealata* (Brunner). 64, 65, female from 10 miles south of Kuching, Sarawak, pronotum and head. 66-72, male from Sandakan, Sabah: 66, hind wing; 67, supraanal plate and paraprocts; 68, left genital phallomere; 69, subgenital plate and genitalia (dorsal); 70, hooklike right phallomere; 71, tarsal claws and arolium; 72, right corner of hind margin of subgenital plate (dorsal). Scales (mm): 64, 65, 1.0; 66, 2.0; 67, 0.5; 68, 0.15; 69, 0.5; 70-72, 0.15.

are very similar to that of *longealata* (Fig. 63).

***Margattea longealata* (Brunner)**
Figs. 62-72

Phyllodromia longe-alata Brunner 1898: 205, pl. 16, fig. 9 (♀).

Phyllodromia longealata Brunner: Kirby 1904: 92; Shelford 1908b: 13; Hanitsch 1915: 42; 1923b: 463; 1925: 83 (♂).

Kuchinga longealata (Brunner): Hebard 1929: 46.

Margattea longealata (Brunner): Hanitsch 1933a: 232; Princis 1969: 865 (the following references erroneously listed by

Princis under *Margattea longecalata* actually refer to *Balta longecalata* (Hanitsch) Hanitsch, 1930: 254; 1931a: 43; Bruijning 1947: 214—Princis correctly listed these references under *Balta* on page 977 of his catalogue).

Holotype (not examined).—Female, Sarawak; in the Vienna Museum.

Material examined.—Sarawak. (NRSS): Kuching, N. W. Borneo, 2 ♀, 25.v.1900, Dyak coll., pres. 1900 by R. Shelford (det. as *longecalata* by Shelford). (ANSP): same data as above, 1 ♂, 1 ♀ (with ootheca), 27.iii.1900, 1 ♂, 30.iii.1900; 10 miles south of Kuching, 1 ♀ (with ootheca), 27.vi.1910, Beebe.

Sabah. (ANSP): Sandakan, Borneo, 1 ♂, 1 ♂ (terminalia slide 401), 1 ♀ (genitalia slide 403), 1 ♀ (carrying ootheca, wall of the ootheca on slide 400), Baker. [All (ANSP) specimens reported as *Kuchinga longecalata* by Hebard (1929: 46).]

Borneo. (RNHL): Long Petak, M.O., 450 m, 6 ♂, 10 ♀, ix.1925 or ix.–x.1925, H. C. Siebers, Borneo Exp. (NRSS): Pajau River, O. Borneo, 2 ♂, 2 ♀, Mjoeberg (det. as *Margattea longe-alata* Br., by Hanitsch).

Male.—Interocular space slightly less than space between antennal sockets. Maxillary palps with segments 3 and 4 about equal, each longer than the swollen fifth segment. Pronotum suboval (Fig. 64). Tegmina and wings fully developed extending well beyond the end of the abdomen. Hind wing with costal veins thickened on distal halves, median vein simple, cubitus with 2–3 complete and 0 incomplete branches, apical triangle small (Fig. 66). Front femur Type B₂ (with 3 or 4 large proximal spines), tarsal claws with subobsolete teeth on ventral margins (Fig. 71; the denticles cannot be seen under the dissecting microscope but after the claws are treated with KOH and examined under a compound microscope, the weakly defined truncate teeth are seen). Abdominal terga unspecialized. Supraanal plate transverse, narrow, subrectangular, not

reaching hind margin of subgenital plate; right and left paraprocts similar, simple plates without spinelike processes (Fig. 67). Subgenital plate symmetrical, its hind margin and styles (Figs. 69, 72) similar to that of *contingens* (cp. Figs. 51, 55, 56). Genitalia as in Figs. 68–70; phallomeres similar to those of *contingens* (cp. Figs. 51, 57–59).

Coloration.—Head brown with a yellowish orange band between antennal sockets (Fig. 65). Pronotal disk with a broad dark brown band whose oblique sides may or may not be margined by narrow yellowish stripes, lateral border regions semi-hyaline (Fig. 64). Tegmina with anterior borders hyaline, remainder dark brown, a continuation of the dark area of the pronotal disk. Hind wings darkly infuscated, thickened region of costal veins whitish or yellowish. Abdominal terga and sterna dark brown. Legs dark brown. Cerci dark ventrally, light on dorsal surface.

Female.—Interocular space less than distance between antennal sockets (Fig. 65). Cubitus vein of hind wing with 2–3 (rarely 4) complete branches. Supraanal plate narrowly subrectangular; paraprocts weakly dissimilar (Fig. 63). Genitalia as in Fig. 63, similar to that of *contingens* (cp. Fig. 61). Ootheca as in Fig. 62; length, 5.5 mm; width, 2.5; height, 1.5.

Measurements (mm) (♀ in parentheses).—Length, 7.2–11.8 (9.3–11.2) pronotum length × width, 2.3–2.7 × 3.0–3.3 (2.7–3.0 × 3.4–3.9); tegmen length, 7.9–11.9 (11.0–13.8).

Comments.—The color markings of *Margattea longecalata* are strikingly different from those of *M. contingens*. However, male structures (subgenital plate, styles, genitalia) and female genitalia are so similar in both taxa that one might be tempted to consider *longecalata* a color morph, variant, or subspecies of *contingens*. Additional specimens from other localities should be studied to see how variable the color markings are. The unusual ootheca of *longecalata* is discussed in the section on subfamily

placement. It is likely that *contingens* has a similar ootheca.

ACKNOWLEDGMENTS

I thank the curators and collection managers listed earlier who sent me specimens, Dr. Syoziro Asahina for specimens of *Theganosilpha ogatai* and *T. satsumana*, and Dr. I. W. B. Thornton for the *Margattea paraceylanica*, collected on the 1984 and 1985 Zoological Expeditions to the Krakatau Islands. I am grateful to the Bureau of Flora and Fauna, Australian Biological Resources Study, for partial support.

LITERATURE CITED

- Asahina, S. 1979. Taxonomic notes on Japanese Blattaria. X. *Margattea* and *Theganosilpha*. Jap. J. San. Zool. 30: 107-119 (Japanese; English summary).
- Bey-Bienko, G. Ya. 1938. Blattodea and Dermaptera collected by Mr. R. J. H. Kaulback's expedition to Tibet. Proc. R. Entomol. Soc., London, 7B (Pt. 6): 121-125.
- . 1950. Fauna of the U.S.S.R. Insects, Blattodea. Tr. Zool. Inst. Akad. Nauk SSSR (n.s.) No. 40, 342 pp. (Russian).
- . 1957. Blattodea. I. The results of the Chinese-Soviet zoologico-botanical expeditions to southwestern China. Entomol. Obozr. 36: 895-915. (Russian; English summary.)
- . 1958. Results of the Chinese-Soviet zoological-botanical expeditions of 1955-56 to southwest China. Entomol. Obozr. 37(3): 670-686. (in Russian; English translation, Entomol. Rev. 37(3): 582-597 (1958).)
- Bohn, H. 1987. Reversal of the right-left asymmetry in male genitalia of some Ectobiinae (Blattaria: Blattellidae) and its implications on sclerite homologization and classification. Entomol. scand. 18: 293-303.
- Brown, V. K. 1973. Aspects of the reproductive biology of three species of *Ectobius* (Dictyoptera: Blattidae). Entomologia exp. appl. 16: 213-222.
- . 1975. Development of the male genitalia in *Ectobius* spp. Stephens (Dictyoptera: Blattidae). Int. J. Insect Morphol. Embryol. 4: 49-59.
- Brujning, C. F. A. 1947. An account of the Blattidae (Orthoptera) from Celebes, the Moluccas, and New Guinea. Zool. Meded., Leyden 27: 205-252.
- . 1948. Studies on Malayan Blattidae. Zool. Meded., Leyden 29: 1-174.
- Brunner von Wattenwyl, C. 1898. Orthopteren des Malayischen Archipels, gesammelt von Prof. Dr. W. Kükenthal in den Jahren 1893 und 1894. Abh. Senckenb. Naturf. Ges. 24: 193-288.
- Caudell, A. N. 1927. On a collection of orthopteroid insects from Java made by Owen Bryant and William Palmer in 1909. Proc. U.S. Natl. Mus. 71: 1-41.
- Dammerman, K. W. 1922. The fauna of Krakatau, Verlaten Island and Sebesy. Treubia 3: 61-112.
- . 1929. Krakatau's new fauna, pp. 83-118. In "Krakatau published for the 4th Pacific Science Congress, Java."
- . 1948. The fauna of Krakatau 1883-1933. Verh. Konink. Neder. Akad. van Wetenschappen, Afd. Natuur. (Tweede Sectie) 44: 1-594.
- Hanitsch, R. 1915. Malayan Blattidae. J. Straits Br. Roy. Asiat. Soc. 60: 17-178.
- . 1923a. On a collection of Blattidae from the Buitenzorg Museum. Treubia 3: 197-221.
- . 1923b. Malayan Blattidae. Part II. J. Malayan Br. Roy. Asiat. Soc. 1: 393-473.
- . 1925. On a collection of Blattidae from northern Sarawak, chiefly Mt. Murud and Mt. Dulit. Sarawak Mus. J. 3: 75-106.
- . 1927. On a collection of Blattidae from southern Annam. J. Siam Soc. Nat. Hist., Supplement 7(no. 1): 7-48.
- . 1928. Spolia Mentawiensia. Blattidae. Bull. Raff. Mus. Singapore, Straits Settlements 1: 1-44.
- . 1929a. Dr. E. Mjöberg's zoological collections from Sumatra. Ark. Zool. 21A: 1-20.
- . 1929b. Fauna Sumatrensis. Blattidae. Tijds. Entomol. 72: 263-302.
- . 1930. Blattidae collected by H.R.H. Prince Leopold of Belgium during a tour in the East. Bull. Ann. Entomol. Belge 70: 254-262.
- . 1931a. Résultats scientifiques du voyage aux Indes Orientales Néerlandaises de LL. AA. RR. le Prince et la Princesse Leopold de Belgique. Mém. Mus. Roy. Hist. Nat. Belgique 4: 39-63. (This is the same as the previous 1930 paper.)
- . 1931b. On a collection of Malayan Blattidae from the British Museum (Natural History). Ann. Mag. Nat. Hist. Ser. 10, 7: 385-408.
- . 1932a. On a collection of blattids from the east coast of Sumatra. Misc. Zool. Sumatr. 6: 1-8.
- . 1932b. Beccari and Modigliani's collection of Sumatran Blattidae in the Museo Civico, Genoa. Ann. Museo Civ. Stor. Natur. Genova 56: 48-92.
- . 1933a. On a collection of Bornean and other oriental Blattidae from the Stockholm Museum. Entomol. Tidsk. 54: 230-245.
- . 1933b. The Blattidae of Mount Kinabalu, British North Borneo. J. Fed. Malay St. Mus., Singapore 17: 297-337.
- . 1934. On a collection of blattids chiefly from Java and northern Australia, made by Professor Ed. Handschin. Rev. Suisse Zool. 41: 111-130.

- . 1936. Fauna Buruana. Blattidae. Treubia, Suppl. 7: 389–400.
- Hebard, M. 1917. The Blattidae of North America north of the Mexican boundary. Mem. Am. Entomol. Soc. 2: 1–284.
- . 1929. Studies in Malayan Blattidae (Orthoptera). Proc. Acad. Nat. Sci. Phil. 81: 1–109.
- . 1943. Australian Blattidae of the subfamilies Chorisoneurinae and Ectobiinae (Orthoptera). Acad. Nat. Sci. Phil. Monog. 4: 1–129.
- Karny, H. 1915. Sauter's Formosa-Ausbeute Orthoptera et Oothecaria. Suppl. Entomol., Berlin 4: 56–104.
- . 1925. Een en ander over kakkerlakken (Blattoidea). De Trop. Natuur, 12: 185–192. (in Dutch.)
- Kirby, W. F. 1904. A synonymic catalogue of Orthoptera. British Mus. (Nat. Hist.) 1: 501 pp.
- . 1910. A synonymic catalogue of Orthoptera. 3. London.
- Krauss, H. A. 1903. Orthopteren aus Australien und dem Malayischen Archipel gesammelt von Professor Dr. Richard Semon. Denkschr. med.-naturwiss. Ges. Jena 8: 743–770.
- Kumar, R. 1975. A review of the cockroaches of West Africa and the Congo basin (Dictyoptera: Blattaria). Bull. Inst. Afr. Noire ser. A 37: 27–121.
- Kumar, R. and K. Princis. 1978. The African species of *Theganopteryx* (Blattaria, Ectobiidae). Syst. Entomol. 3: 19–34.
- McKittrick, F. A. 1964. Evolutionary studies of cockroaches. Cornell Univ. Agric. Exp. St., New York State Coll. Agric., Mem. 389, 197 pp.
- Princis, K. 1950. Indomalaische und australische Blattarien aus dem Entomologischen Museum der Universität in Lund. Opusc. Entomol. 15: 161–188.
- . 1969. Orthopterorum Catalogus (edit. M. Beier). Part 13. Blattariae: Suborder Epilamproidea. Fam. Blattellidae. Junk, s'Gravenhage, pp. 712–1038.
- . 1971. Orthopterorum Catalogus (edit. M. Beier). Part 14. Blattariae: Suborder Epilamproidea. Family Ectobiidae. Junk, s'Gravenhage, pp. 1041–1224.
- Rehn, J. A. G. 1931. On the blattid genera *Abrodiacta* (= *Allacta* Saussure and Zehntner) and *Margattea* (Orthoptera). Trans. Am. Entomol. Soc. 57: 297–304.
- Roth, L. M. 1968a. Oothecae of the Blattaria. Ann. Entomol. Soc. Am. 61: 83–111.
- . 1968b. Oviposition behavior and water changes in the oothecae of *Lophoblatta brevis* (Blattaria: Blattellidae: Plectopterinae). Psyche 75: 99–106.
- . 1971. Additions to the oothecae, uricose glands, ovarioles, and tergal glands of Blattaria. Ann. Entomol. Soc. Am. 64: 127–141.
- . 1982. Ovoviviparity in the blattellid cockroach, *Symploce bimaculata* (Gerstaecker) (Dictyoptera: Blattaria: Blattellidae). Proc. Entomol. Soc. Wash. 84: 277–280.
- . 1984. *Stayella*, a new genus of ovoviviparous cockroaches from Africa. (Dictyoptera: Blattaria, Blattellidae.) Entomol. scand. 15: 113–139.
- . 1985a. A taxonomic revision of the genus *Blattella* Caudell (Dictyoptera, Blattaria: Blattellidae). Entomol. scand., Suppl. 22: 1–221.
- . 1985b. The genus *Symploce* Hebard. IV. Species from Borneo (Kalimantan, Sabah, Sarawak), Sumatra and West Malaysia. (Dictyoptera: Blattaria, Blattellidae.) Entomol. scand. 16: 139–159.
- Saussure, H. de. 1868. Orthopteron species novae aliquot. Rev. Mag. Zool. 20: 354–357.
- . 1869. Mélanges Orthoptérologiques. Mem. Soc. Phys. Hist. nat., Genève 20: 227–326.
- Shelford, R. 1907a. Studies of the Blattidae (continued). Trans. Entomol. Soc. London (1906): 487–519.
- . 1907b. On some new species of Blattidae in the Oxford and Paris Museums. Ann. Mag. Nat. Hist. 19(7): 25–49.
- . 1908a. On a small collection of Blattidae in the Naturhistorischen Museum zu Wiesbaden. Jahrb. Nassau. Ver. Naturk. Wiesbaden 61: 27–38.
- . 1908b. Orthoptera. Fam. Blattidae. Subfam. Phyllodromiinae. in Genera Insectorum, Fasc. 73: 1–29.
- . 1911. Preliminary diagnosis of some new genera of Blattidae. Entomol. Mon. Mag. 22(2): 154–156.
- Shiraki, T. 1931. Orthoptera of the Japanese Empire. II. Blattidae. Insecta Matsumurana 5: 171–209.
- Thornton, I. W. B. and N. J. Rosengren. (In press.) Zoological expeditions to the Krakatau Islands, 1984 and 1985: General introduction. Phil. Trans. R. Soc. Ser. B.
- Vickery, V. R. and D. K. McE. Kevan. 1983. A monograph of the orthopteroid insects of Canada and adjacent regions. Lyman Entomol. Mus. Res. Lab. Mem. 13, 680 pp.
- Walker, F. 1868. Catalogue of the specimens of Blattariae in the collection of the British Museum. London, 239 pp.
- . 1869. Catalogue of the specimens of Dermaptera Saltatoria and supplement to the Blattariae in the collection of the British Museum. London, pp. 119–156.
- . 1871. Supplement to the catalogue of the Blattariae. London, pp. 3–43.